

BRIEF REVIEW OF OPERATIONS AT THE GREAT FALLS PLANT AND
AT THE SLAG TREATING PLANT, EAST HELENA, FOR THE YEAR 1941

For convenience this report has been divided into the following parts:

1. Copper Refineries
2. Zinc Plant
3. Rolling Mills (Anaconda Wire & Cable Company)
4. General
5. Expenditures Against Appropriations
6. Slag Treating Plant, East Helena

1. COPPER REFINERIES

The Electrolytic Copper Refinery operated at an average rate of 82.0% of capacity, and an average current density of 21.7 amperes per square foot, producing 267,879,257 pounds of cathodes. A total of 51,957,100 pounds of cathodes was shipped during the year.

The Furnace Refinery operated 408 furnace days during the year, at an average rate of 62.4% of capacity, producing 216,585,831 pounds marketable shapes. A total of 276,721,096 pounds of refined copper (including 51,957,100 pounds of cathodes shipped to American Brass Company) was shipped during the year.

During the period from December 13th to 28th, both dates inclusive, the Furnace Refinery was down due to heavy shipments of cathodes.

During the year, an average of 550,729 pounds of shapes was produced per furnace day; this constitutes an all-time record high production.



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The distribution of copper shipped during the year was as follows:

	<u>Pounds</u>	<u>Percent of Total</u>
Wire Bar to Rolling Mills	157,227,096	56.82
American Brass Company (Shapes)	62,692,862	22.65
American Brass Company (Cathodes)	51,957,100	18.78
American Brass Company (Ingots)	429,097	0.16
Miscellaneous	<u>4,415,068</u>	<u>1.59</u>
	276,721,096	100.00

276,721,096

The Anode Casting Plant operated 209 furnace days in 1941, producing 44,692,102 pounds of copper anodes, which was returned to the Electrolytic Copper Refinery.

The Silver Slime Plant produced 1,174,670 pounds of leached slime during the year. A total of 1,188,543 pounds of slime, containing 8,710,679.65 ounces of silver and 100,105.960 ounces of gold, was shipped to the Raritan Copper Works.

The Scalping Plant operated 234 days in 1941, producing 39,834,077 pounds of scalped wire bar. Shavings amounted to 4,667,904 pounds, or 11.72% of wire bar scalped, which was retreated through the Furnace Refinery.

2. ZINC PLANT

On January 1st, 1941, the Zinc Plant was operating on an 8-unit basis, and continued on this basis for the entire year. On January 9th, the last of 48 additional zinc tanks were placed in operation in the electrolytic division of the Zinc Plant. 48 more tanks were placed in operation on May 9th.

The total production of zinc cathodes for the year was a record-high for one year at 271,462,392 pounds. The previous high production of cathodes in any one year was 253,560,278 pounds in 1927. Of the 271,462,392 pounds, 568,481 pounds came from the retreatment of zinc plant dross and 312,081 pounds from zinc oxide fume from zinc casting bag house. 18,516,385 pounds as zinc dust and

106,752 pounds as cathodes was returned to the Zinc Leaching Department for solution purification. In the retreatment of purification residue for recovery of cadmium, 695,345 pounds of zinc dust was used.

Zinc cathode production on December 26th, 1941 was an all-time record high for one day, with 795,846 pounds produced.

Net slab production in October 1941, was 10,714 tons, as compared with the previous high record of 10,200 tons in December, 1926.

The Casting Plant treated 271,054,041 pounds of cathodes, producing 237,776,590 pounds of slabs and fingers, 19,211,730 pounds zinc dust, 15,030,875 pounds of zinc dross, containing 12,126,042 pounds of zinc, and 1,372,374 pounds of bag house zinc oxide, containing 1,023,102 pounds of zinc. Of the zinc produced in the form of dross, 4,573,447 pounds was shipped to East Chicago, 152,045 pounds was held for retreatment at the Leaching Plant, and 7,704,640 pounds was shipped to Moundville, West Virginia, for treatment with return of recovered zinc. Of the zinc produced in the form of bag house oxide, 718,963 was shipped to East Chicago, and 304,139 pounds was held for retreatment. Of the cathodes treated at the Casting Plant, 176,699,816 pounds was Company zinc, and 94,354,225 pounds was toll zinc. From Company cathodes was produced 145,581,548 pounds slabs and fingers, and from toll cathodes was produced 92,195,042 pounds net slabs.

The net production of 237,776,590 pounds of slabs and fingers was cast as follows:

<u>A. C. M. Company</u>	<u>Pounds</u>
Slabs - Anaconda Electric	15,592,035
Slabs - High Grade	51,692,205
Slabs - High Grade OPM	43,666,477
Slabs - Intermediate No. 1	24,979,456
Slabs - Intermediate No. 1 OPM	8,094,480
Slabs - Intermediate No. 2	532,938
Fingers - High Grade	3,023,957
	<u>145,581,548</u>

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<u>Toll</u>	<u>Pounds</u>
Slabs - Special High Grade	1,887,944
Slabs - High Grade	63,889,453
Slabs - High Grade OPM	10,440,000
Slabs - Prime Western	217,396
Slabs - Intermediate	2,212,189
Slabs - Brass Special	872,804
Slabs - U. S. Company Option	<u>12,675,256</u>
	92,195,042
 Total	 237,776,590

This was a record-high slab production for one year. The previous high production for any one year was 225,257,358 pounds in 1927.

The zinc shipments from the Great Falls Plant for the year were distributed as follows:

	<u>Tons</u>	<u>Percent</u>
American Brass Company Plants	40,957	45.68
International Smelting & Refining Co. Plants	4,623	5.15
Miscellaneous Customers	40,544	45.22
Export	<u>3,541</u>	<u>3.95</u>
	89,665	100.00

Shipments to Miscellaneous Customers include 20 tons of Anaconda Electric balls sent to International Smelting and Refining Company Plants for storage and reshipment.

The Zinc Plant produced during the year a total of 65,034.44 tons of residues for shipment, which contained 16,081,316 pounds of lead, 4,735,001 pounds of copper, 2,592,132.78 ounces of silver and 7,543.302 ounces of gold. Included in this figure is 60,117.87 tons of regular zinc plant residue, 4,894.05 tons of purification copper residue shipped to Anaconda and 22.52 tons of beta-naphthol residue for Anaconda. The 4,894.05 tons of purification copper residue is the result of treating purification residue from both Anaconda and Great Falls Zinc Plants. 472.79 tons of roasted bag house fume and 7,319.01 tons of calcine was

shipped to American Zinc Company. 10.66 tons of East Helena Slag Treating Plant bag house fume was sold elsewhere.

A total of 15,756.10 dry tons of lead bullion, resulting from Great Falls and Anaconda residue and lead concentrate, shipped to the American Smelting and Refining Company at East Helena, was returned to the International Lead Refining Company at East Chicago during 1941.

The Cadmium Plant produced during the year 1,558,393.21 pounds of metallic cadmium, a record-high production for one year, of which 1,335,943.21 pounds was Company cadmium and 222,450.00 pounds toll cadmium. A total of 1,564,125.53 pounds, including that alloyed in debased zinc, was shipped during the year, of which 1,336,068.21 pounds was for the Company and 228,057.32 pounds was toll cadmium. On January 1st, 1942, there was on hand at the Great Falls plant a total of 6,966.58 pounds of finished cadmium, all toll account. 283,151 pounds of cadmium was in process.

57,526.99 tons of purchased concentrate, 72,412.61 tons of toll concentrate, 25,595.94 tons of bag house fume from the Slag Treating Plant at East Helena, 210.40 tons of cadmium-lead fume from the Tocals Plant of the International Smelting and Refining Company, and 47,959.47 tons of zinc concentrate from Anaconda, were treated in the roasters during the year. Toll zinc material treated included 12,374.94 tons of U. S. Smelting Company zinc concentrates, 22,529.19 tons of American Zinc Company concentrates, 42.23 tons of W. R. Grace & Co. concentrates, and 37,466.25 tons of Combined Metals concentrate. The calcine produced from these concentrates and fume, together with 39,106.15 tons of calcine from Anaconda and 9,273.06 tons of purification residue from Anaconda, were treated in the Leaching Plant.

Of the total tonnage of 1941 receipts, exclusive of calcine and purification residue from Anaconda, 2.21% was Montana purchased concentrates, 15.26%

was bag house fume from East Helena, 4.04% came from the Salt Lake district, 4.33% was from the Coeur d'Alene district, 22.51% was Anaconda concentrate, 1.62% came from Washington, 7.08% from Canada, 8.15% from Mexico and .17% from Australia. 16.36% was toll concentrate from the Salt Lake district, 3.73% was toll concentrate from Nevada, .35% was toll concentrate from Washington, 6.55% was toll concentrate from Canada, and 7.64% was toll concentrate from Australia.

In addition to the above concentrates and fume, we received 38,711.02 tons of Anaconda calcine containing 46,355,647 pounds of zinc, and 9,273.06 tons of purification residue containing 7,643.425 pounds of zinc.

During the year we produced a total of 6,611.30 troy ounces of indium, of which 756.78 ounces was electrolytic grade and 5,854.52 ounces commercial grade. We sold 1,663.87 troy ounces electrolytic indium and 6,176.36 troy ounces commercial indium, or a total of 7,840.23 troy ounces. January 1st, 1942, we had on hand at Great Falls in finished form, 6,643.76 troy ounces of indium, 1,616.12 ounces being electrolytic grade and 5,027.64 ounces commercial grade.

3. ROLLING MILLS DEPARTMENT (ANACONDA WIRE AND CABLE COMPANY)

The No. 1 Rod Mill operated 450.56 shifts and the No. 2 Rod Mill operated 12.44 shifts during 1941.

The net rod production for the No. 1 Mill for the year was 160,446,318 pounds and the gross production (including scrap and scale) was 166,772,449 pounds. The net rod production for the No. 2 Mill for the year was 2,209,266 pounds, and the gross production was 2,282,710 pounds.

The production of wire, including wire made into strand, was 22,004,656 pounds. There was also produced during the year 220,768 pounds of drawn rods and 819,532 pounds of twisted flat wire, making a total wire and drawn rod production

of 23,044,956 pounds. The strand production was 15,424,926 pounds. There was no intermediate wire produced during the year and no outside shipments of copper scaling were made.

On November 14th, 1941, the Rod Mill produced 434,634 pounds, or 1,398 bars, on one shift, to set a new record production figure.

4. GENERAL

The annual report of Mrs. Dahl, our Industrial Nurse, shows that during the year she made 956 house calls and averaged four hours per day in the Clinic office, caring for 104 women and holding 234 baby clinics. She also made 65 calls at the hospitals. In the homes she cared for a total of 576 patients; 37 men, 230 women, 205 pre-school children, and 104 school children. During the year she looked after and gave advice for 83 babies belonging to employees' families.

Membership in the A. C. M. Club was 811, as compared with 813 in 1940.

The golf course was again very popular. Registration for games played totaled 4,011, with July the peak month with 1,048 registrations. Several Plant tournaments, including novelty tournaments, and various other tournaments in which groups from the City participated, were held. Eleven golfers represented the A. C. M. Club at the State Golf Tournament.

Bowling continued to be a favorite activity with 70 Booster teams and 10 Straightaway teams bowling on our alleys, and 4 Class A teams bowling in the City League downtown as A. C. M. Club representatives. There were 14 women's teams, made up of wives of employees, in the Women's League in 1941. Several bowling tournaments were held during the year, and 5 Class A and 23 Booster teams took part in the State Tournament. One team also entered the National Tournament at St. Paul.

Tennis registration decreased slightly to a total of 288.

Basketball was a major activity in the winter months, with 6 teams sponsored in the Y.M.C.A. league. Softball was popular during the summer, with 10 teams in an intra-plant league.

Although no new books were added to the library, it continued to be widely used by club members.

Three Smokers were held, the Spring Smoker on April 15th, a Thanksgiving Smoker on November 25th, at which golf trophy presentations were made, and a Safety Smoker on December 18th, when safety competition prizes were awarded.

"The Arrowhead", a magazine sponsored by the A. C. M. Club and containing news of interest to employees, continued publication monthly throughout the year.

On October 1st, salaries of all monthly-paid employees receiving over \$65.00 and less than \$350.00, base rate, were increased \$18.75 per month. Salaries from \$350.00 to \$500.00, base rate, were increased 10%. Salaries of more than \$500.00 and not more than \$600.00, base rate, were increased \$50.00, and salaries of \$65.00 were increased \$10.00.

With the signing of new contracts, wages of daily-paid Mill and Smeltermen and Electrician employees were increased, on October 1st, by 75¢ per shift. The same increase was made, effective September 18th, for daily-paid members of Crafts Unions.

In summarizing Safety and First Aid activities at the Great Falls Reduction Departments and the Anaconda Wire and Cable Company Departments at Great Falls, and the Slag Treating Plant at East Helena, the most noteworthy achievement was that for the fourth successive year all departments went through the year without a fatal accident or loss of limb to any employee. Seven single departments went through the entire year without a lost-time injury of any kind. The rate

for the year was 1.81 total accidents in 1941 as against 0.91 for 1940, based on 10,000 shifts worked. The serious accident rate was 0.73 per 10,000 shifts as compared with 0.38 in 1940. The total number of accidents for the year was 96 as compared with 43 in 1940.

In 1941, one \$100.00 and eight \$50.00 prizes were given to employees below the rank of foreman, who went through the year without a lost-time accident; one \$100.00 and two \$50.00 awards were given in the foreman group, and one \$100.00 prize in the department superintendent's group. The 1941 contest ended December 1st, and prizes were awarded at a Smoker just before Christmas.

The Annual First Aid Contest was held on the A. C. M. Club Lawn on June 28th, with 21 teams of 6 men each competing; 20 from Great Falls, and one from East Helena. The number of teams was limited by reason of plant operations. Only one man with previous training was allowed on each team and a total of 105 men received first aid training for the first time.

Safety meetings were held in all departments during the year, and many worthwhile safety suggestions were received and put into effect. The causes of past accidents and how to prevent their recurrence were discussed by the men. A new innovation, which was well received by the men, was the use of moving pictures at these meetings to illustrate safety, good housekeeping, and prevention of accidents. Regular weekly visits were made by the Safety and Welfare Engineer to each of the City Hospitals to visit sick and injured employees. There were 4,182 employee-visits to the First Aid Station for treatment of injuries and 726 for treatment of sickness. First Aid training was given to Junior High School pupils for one hour each week by a member of the First Aid staff during the school year.

5. EXPENDITURES AGAINST APPROPRIATIONS

✓ \$4,506.40 was spent in completion of new roof over east end of Zine

Casting Building and new zinc dust building and fume collecting and recovering system. Of the total cost of \$96,667.04 for this construction, \$92,160.64 was spent in 1940.

✓ Of a total of \$189,097.11 spent for the installation of a Cottrell Electrical Precipitator, which was put into operation early in January, 1941, \$2,128.87 was spent in 1941. Total appropriation was \$194,000.00.

✓ \$7,495.94 was spent in 1941 to complete cost of cathode bars and other expenses incident to use of lighter copper anodes at reduced current density. Total cost was \$15,305.24.

✓ \$45,667.72, of a total cost of \$94,092.52, was spent in 1941 for 72 additional tanks in the electrolytic division of the Zinc Plant and 2 Shriver presses in the leaching division. Total cost was \$14,370.48 less than appropriation.

✓ A first aid office was completed at the Copper Refineries at a total cost of \$2,813.24.

✓ \$52,991.64 was spent for 45 additional tanks in the zinc electrolyzing division, construction of floor in east end of Zinc Plant boiler house for a cadmium casting room, and raising the roof of cadmium tank house.

✓ A two-stage pump for the city water supply was purchased and installed at a total cost of \$1,778.57.

✓ \$3,713.19, of a total appropriation of \$4,151.00, was spent for an oven to heat silica flour for Prodorite plant.

✓ One American 825-CD diesel-operated locomotive crane and one clam-shell bucket was purchased at a total cost of \$23,716.84.

✓ \$1,951.02 was spent for the purchase and installation of a Pexto vertical press for cutting slots in starting sheets at the Electrolytic Copper Refinery.

✓ A two-unit extension to the purification division of the Zinc Plant has been started, with \$144.29 spent in 1941.

✓ Spray equipment for cooling gases in brick flue at the East Helena Slag Treating Plant was installed at a total cost of \$1,070.93.

✓ A total of \$6,018.14 was spent for an increase in bag house capacity at the East Helena Slag Treating Plant.

✓ Appropriation of \$3,826.00 for equipment for leaching cadmium sponge at purification residue plant has been made, but there was no expenditure on this appropriation in 1941.

The following appropriations and expenditures were made at the Rolling Mills Department:

✓ Changes to Rolling Mills, Wire Bar Furnace, Roughing Mills, Intermediate and Finishing Mills were completed at a cost of \$128,632.84, of which \$23,106.87 was spent in 1941.

✓ Installation of one 2-head collapsible coiling stand was completed at a total cost of \$1,066.02. \$70.93 of this amount was expended in 1941.

✓ A total expenditure of \$1,948.94 was made for spare motors for new Rod Mill equipment.

✓ One model J-80 Microwelder was purchased at a total cost of \$1,021.43.

✓ \$14,801.98, of a total appropriation of \$17,315.00, was spent for the installation of automatic delivery guide to Intermediate Mill and repeaters in Intermediate and Finishing Mill.

✓ One Terkelsen model 4 large wire coil wrapper, complete with motor, was purchased in 1941 at a total cost of \$1,732.74.

\$5,547.72 was spent for the purchase of one twisting machine.

\$1,324.62, of a total appropriation of \$2,529.04, was spent for the installation of a flat mill transferred from Sycamore.

✓ Two stranding machines were transferred to Sycamore at a total cost of \$1,294.30.

✓ \$940.46 was spent in 1941 for the installation of low pressure blower at annealing furnace. Total appropriation is \$988.00.

✓ \$836.19 was expended for the purchase of two liftabout junior hoists, Class H, 500# capacity.

✓ A Watson 84" 6-ton reel stand was purchased for \$2,514.75.

✓ \$708.30, of a total appropriation of \$750.00, was spent on two Micro-welders Model J-4-S.

✓ Appropriations of \$40,000.00 for the addition of new coilers, quench tank and conveyors, \$439.73 for Carbaby grinder for roll turning tools, \$555.00 for steam standby pump for billet furnace cooling water, and \$4,765.00 for installation of 6" centrifugal pump to boost water pressure at Mill, were approved, but no expenditures were made in 1941.

6. SLAG TREATING PLANT

The Slag Treating Plant operated from the first of the year until January 22nd, when it shut down at the end of afternoon shift to clean out the flue system. It resumed operation at 4:00 A. M. January 23rd. The plant was again shut down on April 27th to clean the flue system and make repairs, and operation was resumed at 10:45 P. M. May 1st. On July 3rd, the plant again shut down at the end of night shift for cleaning and repairs and resumed operation during the night shift of July 9th. The plant shut down on July 23rd due to a power failure and resumed operation July 25th at 10:00 A. M. On September 10th at 11:00 A. M. the plant shut down for repairs and cleaning and resumed operation at 3:15 P. M. September 11th. The plant was shut down at the end of night shift

on October 19th for construction of a new brick flue. It resumed operations on November 6th, and continued without shutdown the remainder of the year.

There was treated during the year, 144,930.20 tons of molten slag and sculls assaying 12.296% zinc, and 25,559.70 dry tons of cold slag from dump, assaying 11.743% zinc, making a total of 170,489.90 dry tons assaying 12.213% zinc. Previous high tonnage for any year was 163,923.40 tons in 1940.

The production resulting was 26,782.35 dry tons of fume assaying 67.991% zinc, showing a recovery of 87.453% of zinc content of slag treated.

25,282.50 dry tons of fume was shipped to Great Falls for treatment in the Zinc Plant, 1,095.18 was shipped to the American Zinc Company, and 32.66 dry tons was sold locally.

17,710 tons of slag was treated in December, 1941, at the Slag Treating Plant, surpassing the previous record of 17,341 tons made in June, 1941, for monthly tonnage when the A. S. & R. Company are operating two or more blast furnaces. While the monthly total is high in December, the average per day of 573 tons in June, 1941, is a record high average per day figure.

On June 8th, 573 tons of slag was treated for a new record daily production.

The net cost for February, 1941, when 15,596 tons of slag was treated, was \$1.64, which compares with the previous record of \$1.72 in April, 1938.